REMARKS

Claims 1-34 and 47-56 are pending. Claims 35-46 are canceled without prejudice in response to Examiner's restriction requirement. Claims 47-56 are rejected under 35 U.S.C. § 112, first paragraph. Claims 1-34 and 47-56 are rejected under 35 U.S.C. § 103(a).

The paragraph at page 12, line 5 is amended to correct a figure number. The paragraph at page 20, line 22 is amended to correct an identification numeral and a figure number.

Claims 47-56 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Specifically, Examiner states independent claim 47 and depending claims 48-56 disclose correlating the entire received preamble with a preamble created (spread through repetition of the second number of signals) at the receiver using a code. Examiner further states the specification consistently discloses that the receiver despreads the received preamble before correlation with a code. Applicant respectfully reminds Examiner that the written description requirement of 35 U.S.C. § 112, first paragraph, is directed to the specification and not to the claims. The claims need not recite every limitation found elsewhere in the specification.

Referring to the embodiment of Figures 5 and 6, claims 47-56 recite "A method of decoding a preamble from a remote transmitter, comprising the steps of: receiving (86) a first number of groups (256) of signals having a second number of signals (16) in each group from a data stream having a predetermined length (4096); and correlating (94) the first number of groups of signals with a code having the second number of signals repeated the first number of times, the code corresponding to the remote transmitter." (numerals added). These features are described in detail from page 18, line 16 through page 20, line 28. Thus, applicant respectfully submits that claims 47-56 are patentable under 35 U.S.C. § 112, first paragraph.

Claims 1-9, 20-22, and 25-29 are rejected under 35 U.S.C. § 103(a) as being unpatentable over applicant's admitted prior art (AAPA) in view of Minn et al. (U.S. Pat. No. 6,088,347). To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

IMPROPER COMBINATION OF REFERENCES

1. The initial burden is on the examiner to provide some suggestion of the desirability of doing what the inventor has done. "To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or *the examiner must present a convincing line of reasoning* as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." (emphasis added). *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). Neither applicant's admitted prior art (AAPA) nor Minn et al. expressly or impliedly suggest the claimed invention. AAPA discloses a preamble of the prior art was formed by "spreading each bit of a sixteen-bit Gold code signature symbol A over a number of chips, for example 256 chips; in this case, the sixteen bit symbol becomes sixteen sequences of 256-chip values, for a total length of 4096 chips." (page 4, lines 24-27). For example, if the sixteen-bit Gold code A is $a_1a_2a_3 \ldots a_{16}$, then the prior art preamble is $d_1a_1d_2a_1d_3a_1 \ldots d_{256}a_1d_1a_2d_2a_2d_3a_2 \ldots d_{256}a_2 \ldots d_{256}a_{16}$, where the sequence $d_1d_2d_3 \ldots d_{256}$ is the spreading code. Since Gold code A is distributed over the entire 4096 chip sequence, correlation with all sixteen bits of this preamble required 4096 samples. By way of contrast, the preamble of Figure 5 of the present invention has the form $h_1c_1h_2c_2h_3c_3 \ldots$

$h_{16}c_{16}h_1c_{17}h_2c_{18}h_3c_{19} \ldots h_{16}c_{32} \ldots h_{16}c_{4096}$, where the sequence $h_1h_2h_3 \ldots h_{16}$ is the Walsh code arranged as a symbol, repeated a selected number of repetitions and $c_1c_2c_3 \ldots c_{4096}$ is the long code. Correlation with the preamble of Figure 5, therefore, only requires sixteen chips.

Applicant has observed that accumulated Doppler phase shift of the prior art preamble $d_1a_1d_2a_1d_3a_1 \ldots d_{256}a_1d_1a_2d_2a_2d_3a_2 \ldots d_{256}a_2 \ldots d_{256}a_{16}$ can cause cross-correlation with another preamble $d_1b_1d_2b_1d_3b_1 \ldots d_{256}b_1d_1b_2d_2b_2d_3b_2 \ldots d_{256}b_2 \ldots d_{256}b_{16}$, where $b_1b_2b_3 \ldots b_{16}$ is another Gold code corresponding to another user. These cross-correlation problems may prevent a receiving base station from resolving simultaneous transmission requests. (page 5, lines 1-11). For example, a chip rate of 4×10^6 chips per second corresponds to a correlation period T of 1 ms for 4096 chips. A mobile unit traveling at an exemplary speed of 120 kph would accumulate a 200 Hz Doppler shift. The reciprocal of the Doppler shift is 5 ms. This is the time between deep nulls in the received signal due to destructive interference. A signal peak occurs at midpoint between the deep nulls. A difference in signal strength between the signal peak the deep nulls 2.5 ms to each side of the signal peak is often 25 dB. Thus, a significant change in signal strength occurs at high Doppler rates from the beginning to the end of the 1 ms correlation period. By way of contrast, the present invention only requires a correlation period of 4 μs for a single instance of the sixteen-chip spread code over which there is virtually no change in signal strength even at high Doppler rates. Applicant respectfully submits there is nothing in AAPA or other cited references apart from the instant specification that reveals this problem or the claimed invention. Moreover, Minn et al. fail to disclose initiating wireless communications between a mobile unit and a remote base station or even mention a preamble. Thus, neither AAPA nor Minn et al. expressly or impliedly suggest the claimed invention.

2. Examiner states Minn et al. teach having a spread code (user specific code) be a symbol (Walsh code) repeated a selected number of repetitions since this is part of the CDMA IS-95 standard. (page 6, Office Action 4/2/04). Applicant has included excerpts from

the TIA/EIA-95-B (CDMA IS-95) standard, dated October 31, 1998, as Appendix A in the present response. The excerpts include a cover page and pages 6-12 through 6-14, 6-24 through 6-32, and 6-417 through 6-418. Referring to page 6-417, last paragraph, the CDMA IS-95 standard recites "On each Access Channel transmission, the mobile station shall transmit a preamble consisting of frames of 96 zeros (see 6.1.3.2.2.1), starting at the beginning of the slot (plus PN randomization, as specified in 6.6.3.1.1.2) . . . . The mobile station shall transmit an *Access Channel Message* capsule immediately following the preamble." (emphasis in original). This format of this Access Channel transmission is shown at Figure 6.7.1.1-1 on page 6-418. This all-zero sequence is combined with a long code from the Long Code Generator of Figure 6.1.3.1-2 (page 6-14) by Modulo-2 Addition to produce a preamble for CDMA IS-95. Here, Modulo-2 Addition is the same as an exclusive OR operation (XOR). This XOR combination of an all-zero sequence and the long code is simply the long code. The CDMA IS-95 preamble did not employ a repeated Walsh code. Therefore, the AAPA preamble and the CDMA IS-95 preamble cited by Minn et al. both specifically teach away from the present invention.

Reverse link data transmission for both Access Channel and normal data transmission are encoded as described at pages 6-12 through 6-13 and shown in Figure 6.1.3.1-2 (page 6-14). Data passes through the Convolutional Encoder and Symbol Repetition blocks (described at paragraphs 6.1.3.1.3 and 6.1.3.1.4, pages 6-24 through 6-26) and is rearranged by the Block Interleaver (described at paragraph 6.1.3.1.5, pages 6-26 through 6-30). Data from the Block Interleaver is applied to the 64-ary Orthogonal Modulator. Operation of the 64-ary Orthogonal Modulator is described at page 6-31. Therein, the Modulation symbol index is determined as a decimal equivalent of the 6 binary valued code symbols (bits). Note that 2^6 is equal to 64. This decimal equivalent is then used as an index to select one of the 64 Walsh codes from Table 6.1.3.1.6-1. The selected Walsh code is then combined with the long code from the Long Code Generator. Thus, a 64-bit Walsh code is transmitted corresponding to each 6 bits of data. But the 64-bit Walsh codes are not the same. Each successive Walsh code is selected in response to 6 data bits. In general, each successive group of 6 data bits at

the output of the Block Interleaver will be different, so each corresponding 64-bit Walsh code will be different.

This is entirely different from the present invention. Claims 1-10, for example, recite "A method of operating a wireless communications unit to request a connection with a base station, comprising the steps of: . . . *selecting one of a plurality of orthogonal codes* for the preamble; generating a spread code using the selected orthogonal code, *the spread code arranged as a symbol of the selected code, repeated a selected number of repetitions*." Thus, one of ordinary skill in the art would not think to combine AAPA, Minn et al., and CDMA IS-95 to achieve the present invention.

3. "There are three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art." *In re Rouffet,* 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998) (The combination of the references taught every element of the claimed invention, however without a motivation to combine, a rejection based on a *prima facie* case of obvious was held improper.). Neither the problem to be solved nor the teachings of the prior art suggest would suggest the present invention to one of ordinary skill in the art. The problems at issue in the instant specification are not mentioned in any of the cited references apart from applicant's disclosure. Minn et al. fail to disclose initiating wireless communications between a mobile unit and a remote base station or even mention a preamble. Finally, if these problems at issue in the instant specification were known to persons of ordinary skill in the art, they would certainly have used the present invention rather than the AAPA preamble. Since the present invention was not used in lieu of AAPA, one must conclude that the problems at issue in the instant specification were not known to persons of ordinary skill in the art. Thus, applicant respectfully submits that no motivation to combine AAPA with Minn et al. could arise from the nature of the problem to be solved, the teachings of the prior art, or the knowledge of persons of ordinary skill in the art.

4. Examiner states that AAPA and Minn et al. are directed to transmitting signals between a mobile terminal and a base station. (page 2, Office Action 4/2/04). Applicant agrees. Both AAPA and IS-95 (cited by Minn et al.) employ their own respective preambles to initiate reverse link communications with a base station. Why would one of ordinary skill in the art think to change them? Examiner has failed to find any possible motivation in either reference to modify either preamble in view of AAPA and Minn et al. Examiner offers no other basis for the combination. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). Here, the present invention and AAPA are both directed to transmitting a preamble to initiate wireless communication with a remote base station. By way of contrast, Minn et al. teach encoding data for transmitting after communications are established. Minn et al. fail to disclose initiating wireless communications between a mobile unit and a remote base station or even mention a preamble or the associated Doppler phase shift problem. The subject matter of AAPA and Minn et al., therefore, is completely different and the problems associated with each reference are completely different. Thus, there is no explicit or implicit teaching or suggestion to combine AAPA with Minn et al. in either reference.

5. The mere fact that references <u>can</u> be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990) (Claims were directed to an apparatus for producing an aerated cementitious composition by drawing air into the cementitious composition by driving the output pump at a capacity greater than the feed rate. The prior art reference taught that the feed means can be run at a variable speed,

however the court found that this does not require that the output pump be run at the claimed speed so that air is drawn into the mixing chamber and is entrained in the ingredients during operation. Although a prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so." 916 F.2d at 682, 16 USPQ2d at 1432.). See also *In re Fritch*, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992) (flexible landscape edging device which is conformable to a ground surface of varying slope not suggested by combination of prior art references). The instant specification teaches significant advantages of the present invention over the prior art. Referring to the embodiment of Figure 7, the short coherency length (16) of each Walsh Hadamard code symbol allows preambles of rapidly moving mobile units to be reliably resolved, since the accumulated Doppler phase shift is insignificant over such a short code length. However, the repetition of the symbols (256) over the long code length (4096) provides the ability to resolve preambles transmitted by wireless units at widely varying distances within the cell. (page 23, lines 1-7). Minn et al. fail to teach or suggest such problems or solutions. Minn et al. fail to make any reference to initiating wireless communications or using a preamble. One of ordinary skill in the art at the time of the present invention would have no motivation, therefore, to combine Minn et al. with AAPA apart from access to the instant specification.

6. If a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984) (Claimed device was a blood filter assembly for use during medical procedures wherein both the inlet and outlet for the blood were located at the bottom end of the filter assembly, and wherein a gas vent was present at the top of the filter assembly. The prior art reference taught a liquid strainer for removing dirt and water from gasoline and other light oils wherein the inlet and outlet were at the top of the device, and wherein a pet-cock (stopcock) was located at the bottom of the device for periodically removing the collected dirt and water. The reference further taught that the separation is assisted by gravity. The Board concluded the

claims were *prima facie* obvious, reasoning that it would have been obvious to turn the reference device upside down. The court reversed, finding that if the prior art device was turned upside down it would be inoperable for its intended purpose because the gasoline to be filtered would be trapped at the top, the water and heavier oils sought to be separated would flow out of the outlet instead of the purified gasoline, and the screen would become clogged.). By way of comparison, Minn et al. disclose modulating a data signal $b_1[n]$ with "a cell-specific code PN $p_j[n]$ and a user-specific code $w_i[n]$" to communicate over a wireless network. (col. 4, lines 3-6). If this data signal $b_1[n]$ is modified to an all one condition to emulate the present invention, there is no data signal or communication over the wireless network. Alternatively, if the modulated data signal is substituted for the preamble of the present invention, the remote receiver will be unable to resolve two unknown data signals. Communication in the modified cell is rendered inoperative. Therefore, there can be no suggestion or motivation to make such a modification.

7. Examiner mistakenly cites *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985) stating "the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious." (page 3, Office Action 4/2/04). Applicant respectfully submits that *Ex parte Obiaya* is irrelevant to patentability of the present invention. There is nothing in any cited reference apart from applicant's disclosure that teaches or suggests the Doppler phase shift problem or the solution of the present invention. Thus, there is no suggestion in AAPA or Minn et al. that applicant might follow to achieve the present invention. Furthermore, differences between the cited references and the present invention are not otherwise obvious. There is nothing in either AAPA or Minn et al. to suggest the problem or the solution of the present invention. Minn et al. does not even mention initiation of wireless communication with a remote receiver or a preamble. Moreover, Minn et al. do not teach or suggest the Doppler phase shift problem or the solution of the present invention. The uniqueness of disclosed problems and solutions of the present

invention demonstrate there can be no desirability of the combination of AAPA and Minn et al.

NO REASONABLE EXPECTATION OF SUCCESS

Obviousness does not require absolute predictability, however, at least some degree of predictability is required. *Evidence showing there was no reasonable expectation of success may support a conclusion of nonobviousness.* (emphasis added). *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976) (Claims directed to a method for the commercial scale production of polyesters in the presence of a solvent at superatmospheric pressure were rejected as obvious over a reference which taught the claimed method at atmospheric pressure in view of a reference which taught the claimed process except for the presence of a solvent. The court reversed, finding there was no reasonable expectation that a process combining the prior art steps could be successfully scaled up in view of unchallenged evidence showing that the prior art processes individually could not be commercially scaled up successfully.). Minn et al. is silent on preambles to initiate communication with a remote receiver. Applicant has included excerpts from the CDMA IS-95 standard cited by Minn et al. at Appendix A. The persons of ordinary skill in the art who drafted CDMA IS-95 did not use these repeated Walsh codes for their preamble as previously discussed. Applicant respectfully submits that this is objective evidence that the persons of ordinary skill in the art who drafted CDMA IS-95 had no reasonable expectation that repeated Walsh codes in a preamble would succeed.

Alternatively, the persons of ordinary skill in the art who drafted CDMA IS-95 did not perceive an advantage that would motivate them to include repeated Walsh codes in their preamble. In this alternative, therefore, the CDMA IS-95 standard is objective evidence that one of ordinary skill in the art would not think to include repeated Walsh codes in their preamble. Thus, Examiner's proposed combination of AAPA and Minn et al. to produce

repeated Walsh codes in a preamble is not indicative of one of ordinary skill in the art. Rather, it is a product of improper hindsight in view of the instant specification.

MISSING LIMITATIONS IN COMBINATION

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Examiner's proposed combination of AAPA and Minn et al. fails to teach all the claimed limitations. For example, claims 1-10 recite, "A method of operating a wireless communications unit to request a connection with a base station, comprising . . . *selecting one of a plurality of orthogonal codes* for the preamble; *generating a spread code using the selected orthogonal code, the spread code arranged as a symbol of the selected code, repeated a selected number of repetitions*; and transmitting, to the base station, a preamble signal corresponding to the spread code." Claims 20-22 recite "A wireless communications unit, comprising . . . a programmable digital circuit, for performing digital operations upon signals to be transmitted and received, the programmable digital circuit programmed to request a connection with a base station by performing operations comprising . . . *selecting one of a plurality of orthogonal codes* for the preamble; *generating a spread code using the selected orthogonal code, the spread code arranged as a symbol of the selected code, repeated a selected number of repetitions*; and transmitting, to the base station, a preamble signal corresponding to the spread code." Claims 25-29 recite "A method of generating a preamble, comprising the steps of: *selecting a first code from a plurality of orthogonal codes*; *repeating the first code a plurality of times to produce a spread code having a predetermined*

length; and multiplying the spread code by a second code having the predetermined length. (emphasis added).

Examiner concedes that AAPA does not disclose these limitations, but states "It would have been obvious to one of ordinary skill in the art at the time of the invention to have the spread code arranged as a symbol of the selected code, repeated a selected number of repetitions, since this is part of the CDMA IS-95 standard." In support of this statement, Examiner cites col. 1, lines 42-48; col. 2, lines 53-64; and col. 4, lines 3-19 from Minn et al. and nothing from IS-95. In fact, col. 4, lines 3-19 is the only citation that even mentions IS-95, and it fails to disclose these limitations. Therein, Minn et al. disclose modulating (Figure 6) a data signal $b_i[n]$ with "a cell-specific code PN $p_j[n]$ and a user-specific code $w_i[n]$." (col. 4, lines 3-6). Minn et al., however, fail to disclose a "spread code arranged as a symbol of the selected code." Applicant has provided excerpts from the CDMA IS-95 standard at Appendix A as disclosed by Minn et al. as previously discussed. These excerpts prove that neither Minn et al. nor the CDMA IS-95 standard teach or suggest the above emphasized limitations. For all the foregoing reasons, therefore, applicant respectfully submits that claims 1-10, 20-22, and 25-29 are patentable under 35 U.S.C. § 103(a) over AAPA in view of Minn et al.

Claims 10-11, 13-15, and 17-19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over AAPA in view of Minn et al. and further in view of Madhow et al. (U.S. Pat. No. 6,175,587). Claim 10 depends from claim 1 and is, therefore, patentable as depending from a patentable claim as previously discussed. Claims 11-19 recite "A method of operating a base station to recover a preamble code transmitted by a wireless unit, comprising the steps of: *receiving a signal corresponding to a preamble*; arranging the signal into a bitstream; *de-interleaving bits from the bitstream, to group corresponding bits from each of a plurality of repetitions of a symbol length, into a plurality of groups*; *despreading the bits of each of the plurality of groups to recover a plurality of symbol bits in a sequence*, the sequence having a length corresponding to a length of the preamble code; and *correlating the sequence to identify a code*, the code corresponding to one of a set of orthogonal codes."

(emphasis added). None of the cited references, taken alone or in combination, disclose these limitations. In fact, with the exception of AAPA, none of the cited references even include the word "preamble." As previously discussed, a combination of AAPA with Minn et al. is improper due to the completely different purposes of their respective disclosures. Even so, a combination of AAPA with Minn et al. fails to disclose a preamble having a plurality of repetitions of an orthogonal code. Furthermore, neither AAPA nor Minn et al. disclose advantages of the present invention. Finally, assuming arguendo that the disclosure of Minn et al. could be modified with hindsight from the instant specification, it would then fail in the intended purpose. Examiner cites Madhow et al. for the disclosure of operating a base station. For all the foregoing reasons, therefore, claims 11-19 are patentable under 35 U.S.C. § 103(a) in view of AAPA combined with Minn et al. and further in view of Madhow et al.

Claims 12 and 23-24 are rejected under 35 U.S.C. § 103(a) as being unpatentable over AAPA in view of Minn et al. and further in view of Madhow et al. and further in view of Bottomley (U.S. Pat. No. 5,237,586). Claim 12 depends from claim 11 and is, therefore, patentable as depending from a patentable claim as previously discussed. Examiner cites Bottomley for the disclosure of a delay line. Referring to Figure 7 of the instant specification, claims 23-24 recite "A base station for a wireless communications network, comprising: . . . baseband circuitry comprising: . . . demodulating and despreading circuitry, for *recovering a preamble code* transmitted by a wireless unit, comprising: . . . a sequence of delay lines (100_0-100_{255}) for receiving a bitstream corresponding to a received signal including the preamble code; a plurality of despreader functions (102_0-102_{15}), each coupled to a tap position in each of the sequence of delay lines, for *receiving corresponding bits from corresponding positions in each of the delay lines, and for generating a bit of a symbol therefrom*; and a code correlation function (104), for comparing the symbol presented by each of the plurality of despreader functions against a set of orthogonal codes, and for *generating a signal indicating the correlation of the presented symbol with each of the orthogonal codes in the set*." (emphasis added). Applicant reiterates all the foregoing arguments with respect to claims 1-22. Additionally, no combination of the cited references discloses the emphasized

limitations of claims 23-24. For example, the embodiment of Figure 7 and claims 23-24 are directed to recovering a preamble code. Each of the despreader functions receive corresponding bits from corresponding positions in each of the delay lines for generating a signal indicating correlation of the presented signal with an orthogonal code. Thus, the presented signal must be repeated a plurality of times to have corresponding bits from corresponding positions in each of the delay lines. Furthermore, since the presented signal correlates to an orthogonal code, the orthogonal code must be repeated a plurality of times in the preamble. As previously discussed, these limitations are neither taught nor suggested by any combination of the cited references. For all the foregoing reasons, therefore, claims 12 and 23-24 are patentable under 35 U.S.C. § 103(a) in view of AAPA combined with Minn et al. and further in view of Madhow et al. and further in view of Bottomley.

In view of the foregoing, applicant respectfully requests approval or the present amendment and reconsideration and allowance of claims 1-34 and 47-56. If the Examiner finds any issue that is unresolved, please call applicant's attorney by dialing the telephone number printed below.

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Appendix A

TR45

Mobile Station-Base Station Compatibility Standard for Dual-Mode Spread Spectrum Systems

SP-3693-1 (to be published as TIA/EIA-95-B)

Publish Version

October 31, 1998

6.1.2.4 Power Transition Characteristics

6.1.2.4.1 Open Loop Estimation

A mobile station operating in Band Class 1 shall use the open loop estimation equations in this Standard, in lieu of the values stated in ANSI J-STD-018.

Following a step change in mean input power, ΔP_{in}, the mean output power of the mobile station shall transition to its final value in a direction opposite in sign to ΔP_{in}, with magnitude contained between mask limits defined by:

(a) upper limit:

for $0 < t < 24$ ms: $\max [1.2 \times |\Delta P_{in}| \times (t/24), |\Delta P_{in}| \times (t/24) + 2.0 \text{ dB}] + 1.5 \text{ dB}$,[2]

for $t \geq 24$ ms: $\max [1.2 \times |\Delta P_{in}|, |\Delta P_{in}| + 0.5 \text{ dB}] + 1.5 \text{ dB}$;

(b) lower limit:

for $t > 0$: $\max [0.8 \times |\Delta P_{in}| \times [1 - e^{(1.25 - t)/36}] - 2.0 \text{ dB}, 0] - 1 \text{ dB}$;

where t is expressed in units of milliseconds, ΔP_{in} is expressed in units of dB, and max [x,y] is the maximum of x and y. These limits shall apply for a step change ΔP_{in} of ±20 dB or less. The absolute value of the change in mean output power due to open loop power control shall be a monotonically increasing function of time. If the change in mean output power consists of discrete increments, no single increment shall exceed 1.2 dB. See 6.1.2.3 for the valid range of the mobile station's mean output power.

6.1.2.4.2 Closed Loop Correction

Following the reception of a valid closed loop power control bit, the mean output power of the mobile station shall be within 0.3 dB of the final value in less than 500 µs for the 1.0 dB step size. For power control step sizes of 0.5 dB and 0.25 dB, the mean output power of the mobile station should be within 0.15 and 0.1 dB respectively, of the final value in less than 500 µs.

6.1.3 Modulation Characteristics

6.1.3.1 Reverse CDMA Channel Signals

The Reverse CDMA Channel is composed of Access Channels and Reverse Traffic Channels. A Reverse Traffic Channel is further subdivided into a single Fundamental Code Channel and zero through seven Supplemental Code Channels. These channels shall share the same CDMA frequency assignment using direct-sequence CDMA techniques. Figure 6.1.3.1-1 shows an example of all of the signals received by a base station on the Reverse CDMA Channel. Each Code Channel of a Reverse Traffic Channel is identified by a distinct user long code sequence; each Access Channel is identified by a distinct Access Channel long code sequence. Multiple Reverse CDMA Channels may be used by a base station in a frequency division multiplexed manner.

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[2] The mask limits allow for the effect of alternating closed loop power control bits.

The Reverse CDMA Channel has the overall structure shown in Figures 6.1.3.1-2 through 6.1.3.1-7. Data transmitted on the Reverse CDMA Channel is grouped into 20 ms frames. All data transmitted on the Reverse CDMA Channel is convolutionally encoded, block interleaved, modulated by the 64-ary orthogonal modulation, and direct-sequence spread prior to transmission.

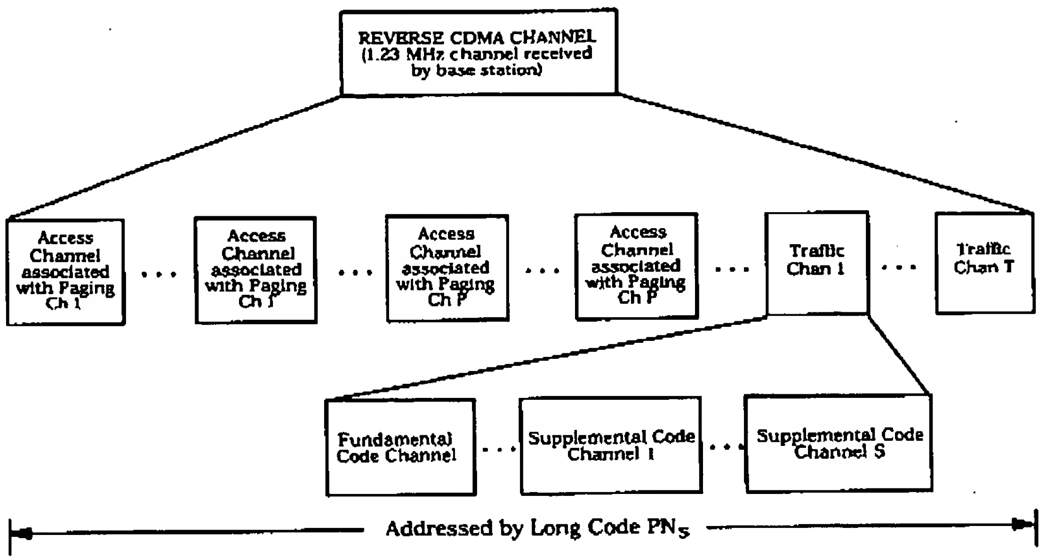
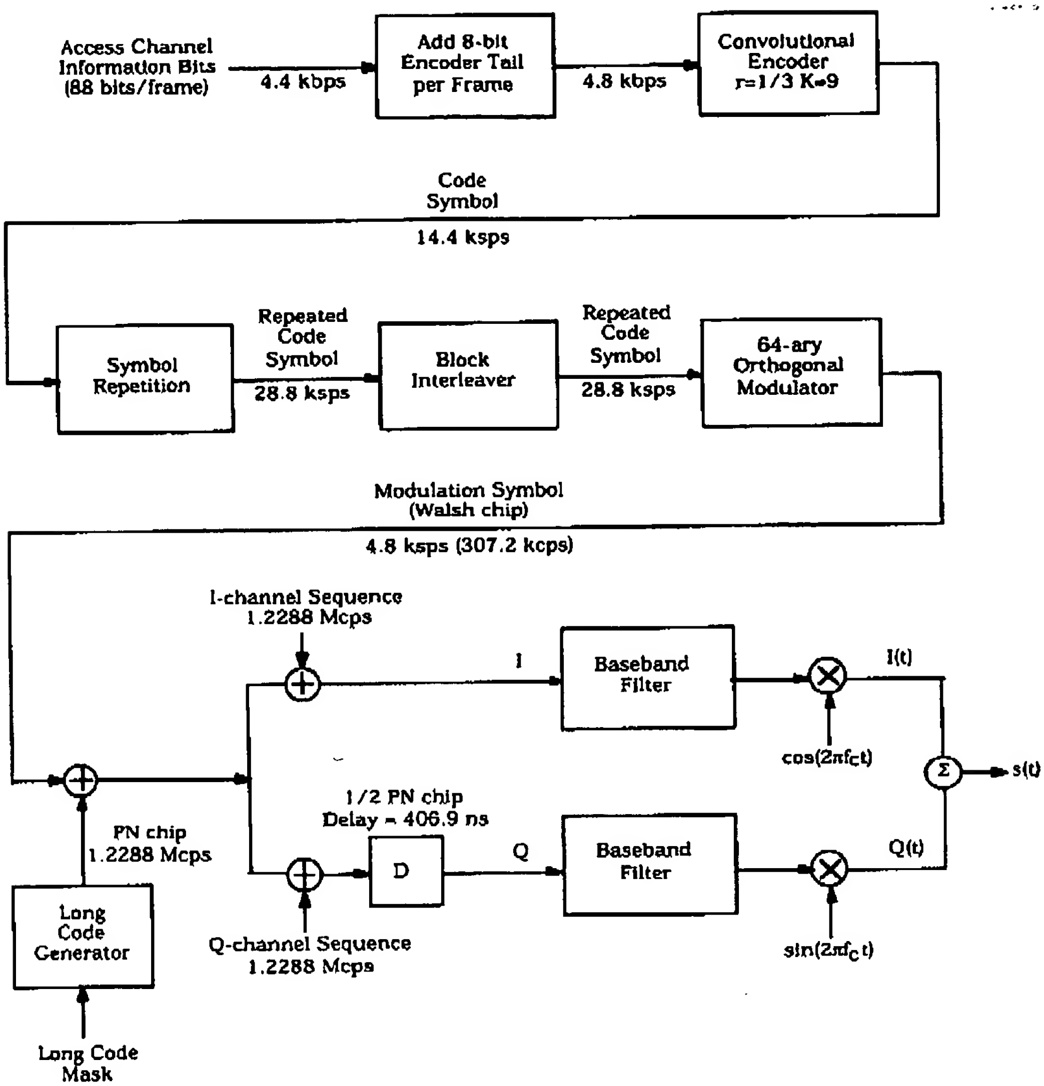


Figure 6.1.3.1-1. Example of Logical Reverse CDMA Channels Received at a Base Station



1

2 **Figure 6.1.3.1-2. Reverse CDMA Channel Structure for the Access Channel**

6.1.3.1.3 Convolutional Encoding

The mobile station shall convolutionally encode the data transmitted on the code channels of the Reverse Traffic Channel and on the Access Channel prior to interleaving. The convolutional code shall have a constraint length of 9. For the Access Channel and Rate Set 1 of the Reverse Traffic Channel code channels, the convolutional code rate shall be 1/3. For Rate Set 2 of the Reverse Traffic Channel code channels, the convolutional code rate shall be 1/2.

Convolutional encoding involves the modulo-2 addition of selected taps of a serially time-delayed data sequence. The length of the data sequence delay is equal to K-1, where K is the constraint length of the code.

6.1.3.1.3.1 Rate 1/3 Convolutional Code

The generator functions for this code shall be g_0 equals 557 (octal), g_1 equals 663 (octal), and g_2 equals 711 (octal). This code generates three code symbols for each data bit input to the encoder. These code symbols shall be output so that the code symbol (c_0) encoded with generator function g_0 shall be output first, the code symbol (c_1) encoded with generator function g_1 shall be output second, and the code symbol (c_2) encoded with generator function g_2 shall be output last. The state of the convolutional encoder, upon initialization, shall be the all-zero state. The first code symbol output after initialization shall be a code symbol encoded with generator function g_0. The encoder for this code is illustrated in Figure 6.1.3.1.3.1-1.

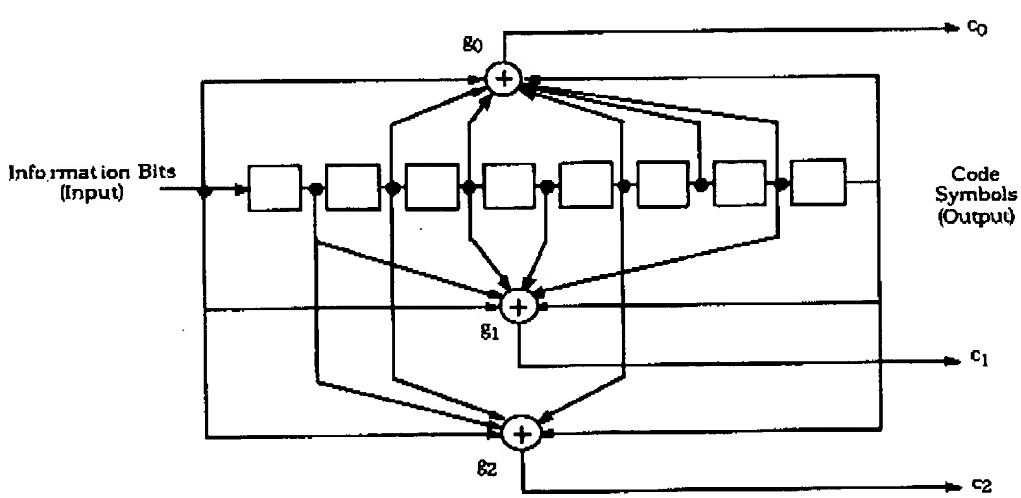


Figure 6.1.3.1.3.1-1. K = 9, Rate 1/3 Convolutional Encoder

6.1.3.1.3.2 Rate 1/2 Convolutional Code

The generator functions for this code shall be g_0 equals 753 (octal) and g_1 equals 561 (octal). This code generates two code symbols for each data bit input to the encoder. These code symbols shall be output so that the code symbol (c_0) encoded with generator function g_0 shall be output first and the code symbol (c_1) encoded with generator function g_1 shall be output last. The state of the convolutional encoder, upon initialization, shall be the all-zero state. The first code symbol output after initialization shall be a code symbol encoded with generator function g_0. The encoder for this code is illustrated in Figure 6.1.3.1.3.2-1.

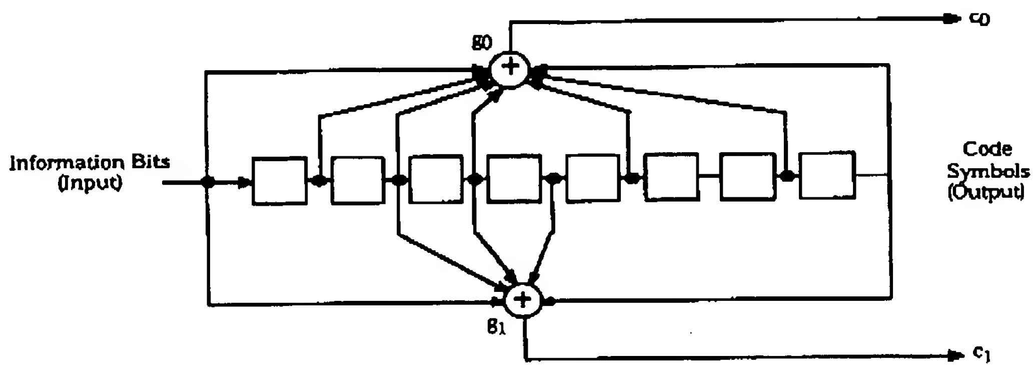


Figure 6.1.3.1.3.2-1. K = 9, Rate 1/2 Convolutional Encoder

6.1.3.1.4 Code Symbol Repetition

Code symbols output from the convolutional encoder are repeated before being interleaved when the data rate is lower than 9600 bps for Rate Set 1 and 14400 bps for Rate Set 2.

Code symbol repetition on the code channels of the Reverse Traffic Channel is only used as an expedient method for describing the operation of the block interleaver specified in 6.1.3.1.5 and the data burst randomizer specified in 6.1.3.1.7.2. Implementations other than code symbol repetition that achieve the same result are allowed.

The code symbol repetition rate on the code channels of the Reverse Traffic Channel varies with data rate. Code symbols shall not be repeated for the 14400 and 9600 bps data rates. Each code symbol at the 7200 and 4800 bps data rates shall be repeated 1 time (each symbol occurs two consecutive times). Each code symbol at the 3600 and 2400 bps data rates shall be repeated three times (each symbol occurs four consecutive times). Each code symbol at the 1800 and 1200 bps data rates shall be repeated seven times (each symbol occurs eight consecutive times). For all of the data rates, this results in a constant repeated code symbol rate of 28800 code symbols per second. On the code channels of the Reverse Traffic Channel these repeated code symbols shall not be transmitted multiple times. Rather, the repeated code symbols shall be input to the block interleaver function,

and all but one of the code symbol repetitions shall be deleted prior to actual transmission due to the variable transmission duty cycle.

For the Access Channel, which has a fixed data rate of 4800 bps, each code symbol shall be repeated 1 time (each symbol occurs 2 consecutive times). On the Access Channel, both repeated code symbols shall be transmitted.

6.1.3.1.5 Block Interleaving

The mobile station shall interleave all repeated code symbols on the code channels of the Reverse Traffic Channel and on the Access Channel prior to modulation and transmission. A block interleaver spanning 20 ms shall be used. The interleaver shall be an array with 32 rows and 18 columns (i.e., 576 cells). Repeated code symbols shall be written into the interleaver by columns filling the complete 32 × 18 matrix. Tables 6.1.3.1.5-1 through 6.1.3.1.5-4 illustrate the ordering of write operations of code symbols into the interleaver array for the four transmission data rates of each rate set.

Reverse Traffic Channel repeated code symbols shall be output from the interleaver by rows. For Rate Set 1, the interleaver rows from the leftmost to the rightmost column shall be output in the following order:

At 9600 bps:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

At 4800 bps:

1 3 2 4 5 7 6 8 9 11 10 12 13 15 14 16 17 19 18 20 21 23 22 24 25 27 26 28 29 31 30 32

At 2400 bps:

1 5 2 6 3 7 4 8 9 13 10 14 11 15 12 16 17 21 18 22 19 23 20 24 25 29 26 30 27 31 28 32

At 1200 bps:

1 9 2 10 3 11 4 12 5 13 6 14 7 15 8 16 17 25 18 26 19 27 20 28 21 29 22 30 23 31 24 32

For Rate Set 2, the interleaver rows shall be output in the following order:

At 14400 bps:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

At 7200 bps:

1 3 2 4 5 7 6 8 9 11 10 12 13 15 14 16 17 19 18 20 21 23 22 24 25 27 26 28 29 31 30 32

At 3600 bps:

1 5 2 6 3 7 4 8 9 13 10 14 11 15 12 16 17 21 18 22 19 23 20 24 25 29 26 30 27 31 28 32

At 1800 bps:

1 9 2 10 3 11 4 12 5 13 6 14 7 15 8 16 17 25 18 26 19 27 20 28 21 29 22 30 23 31 24 32

Access Channel repeated code symbols shall be output from the interleaver by rows. The interleaver rows shall be output in the following order:[3]

1 17 9 25 5 21 13 29 3 19 11 27 7 23 15 31 2 18 10 26 6 22 14 30 4 20 12 28 8 24 16 32

Table 6.1.3.1.5-1. Reverse Traffic Channel Interleaver Memory (Write Operation) for 9600 and 14400 bps

1	33	65	97	129	161	193	225	257	289	321	353	385	417	449	481	513	545
2	34	66	98	130	162	194	226	258	290	322	354	386	418	450	482	514	546
3	35	67	99	131	163	195	227	259	291	323	355	387	419	451	483	515	547
4	36	68	100	132	164	196	228	260	292	324	356	388	420	452	484	516	548
5	37	69	101	133	165	197	229	261	293	325	357	389	421	453	485	517	549
6	38	70	102	134	166	198	230	262	294	326	358	390	422	454	486	518	550
7	39	71	103	135	167	199	231	263	295	327	359	391	423	455	487	519	551
8	40	72	104	136	168	200	232	264	296	328	360	392	424	456	488	520	552
9	41	73	105	137	169	201	233	265	297	329	361	393	425	457	489	521	553
10	42	74	106	138	170	202	234	266	298	330	362	394	426	458	490	522	554
11	43	75	107	139	171	203	235	267	299	331	363	395	427	459	491	523	555
12	44	76	108	140	172	204	236	268	300	332	364	396	428	460	492	524	556
13	45	77	109	141	173	205	237	269	301	333	365	397	429	461	493	525	557
14	46	78	110	142	174	206	238	270	302	334	366	398	430	462	494	526	558
15	47	79	111	143	175	207	239	271	303	335	367	399	431	463	495	527	559
16	48	80	112	144	176	208	240	272	304	336	368	400	432	464	496	528	560
17	49	81	113	145	177	209	241	273	305	337	369	401	433	465	497	529	561
18	50	82	114	146	178	210	242	274	306	338	370	402	434	466	498	530	562
19	51	83	115	147	179	211	243	275	307	339	371	403	435	467	499	531	563
20	52	84	116	148	180	212	244	276	308	340	372	404	436	468	500	532	564
21	53	85	117	149	181	213	245	277	309	341	373	405	437	469	501	533	565
22	54	86	118	150	182	214	246	278	310	342	374	406	438	470	502	534	566
23	55	87	119	151	183	215	247	279	311	343	375	407	439	471	503	535	567
24	56	88	120	152	184	216	248	280	312	344	376	408	440	472	504	536	568
25	57	89	121	153	185	217	249	281	313	345	377	409	441	473	505	537	569
26	58	90	122	154	186	218	250	282	314	346	378	410	442	474	506	538	570
27	59	91	123	155	187	219	251	283	315	347	379	411	443	475	507	539	571
28	60	92	124	156	188	220	252	284	316	348	380	412	444	476	508	540	572
29	61	93	125	157	189	221	253	285	317	349	381	413	445	477	509	541	573
30	62	94	126	158	190	222	254	286	318	350	382	414	446	478	510	542	574
31	63	95	127	159	191	223	255	287	319	351	383	415	447	479	511	543	575
32	64	96	128	160	192	224	256	288	320	352	384	416	448	480	512	544	576

[3] This is a bit-reversed readout of the row addresses. If there is a binary counter $c_4c_3c_2c_1c_0$, counting from 0 through 31, and n is a 5-bit binary number, $n = a_4a_3a_2a_1a_0$, where $a_4 = c_0$, $a_3 = c_1$, $a_2 = c_2$, $a_1 = c_3$, $a_0 = c_4$, then the row address is given by n+1.

Table 6.1.3.1.5-2. Reverse Traffic Channel for 4800 and 7200 bps or Access Channel for 4800 bps Interleaver Memory (Write Operation)

1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241	257	273
1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241	257	273
2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242	258	274
2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242	258	274
3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243	259	275
3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243	259	275
4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244	260	276
4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244	260	276
5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245	261	277
5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245	261	277
6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246	262	278
6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246	262	278
7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247	263	279
7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247	263	279
8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248	264	280
8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248	264	280
9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249	265	281
9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249	265	281
10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250	266	282
10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250	266	282
11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251	267	283
11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251	267	283
12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252	268	284
12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252	268	284
13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253	269	285
13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253	269	285
14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254	270	286
14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254	270	286
15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255	271	287
15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255	271	287
16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288
16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288

Table 6.1.3.1.5-3. Reverse Traffic Channel Interleaver Memory (Write Operation) for 2400 and 3600 bps

1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121	129	137
1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121	129	137
1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121	129	137
1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121	129	137
2	10	18	26	34	42	50	58	66	74	82	90	98	106	114	122	130	138
2	10	18	26	34	42	50	58	66	74	82	90	98	106	114	122	130	138
2	10	18	26	34	42	50	58	66	74	82	90	98	106	114	122	130	138
2	10	18	26	34	42	50	58	66	74	82	90	98	106	114	122	130	138
3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139
3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139
3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139
3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139
4	12	20	28	36	44	52	60	68	76	84	92	100	108	116	124	132	140
4	12	20	28	36	44	52	60	68	76	84	92	100	108	116	124	132	140
4	12	20	28	36	44	52	60	68	76	84	92	100	108	116	124	132	140
4	12	20	28	36	44	52	60	68	76	84	92	100	108	116	124	132	140
5	13	21	29	37	45	53	61	69	77	85	93	101	109	117	125	133	141
5	13	21	29	37	45	53	61	69	77	85	93	101	109	117	125	133	141
5	13	21	29	37	45	53	61	69	77	85	93	101	109	117	125	133	141
5	13	21	29	37	45	53	61	69	77	85	93	101	109	117	125	133	141
6	14	22	30	38	46	54	62	70	78	86	94	102	110	118	126	134	142
6	14	22	30	38	46	54	62	70	78	86	94	102	110	118	126	134	142
6	14	22	30	38	46	54	62	70	78	86	94	102	110	118	126	134	142
6	14	22	30	38	46	54	62	70	78	86	94	102	110	118	126	134	142
7	15	23	31	39	47	55	63	71	79	87	95	103	111	119	127	135	143
7	15	23	31	39	47	55	63	71	79	87	95	103	111	119	127	135	143
7	15	23	31	39	47	55	63	71	79	87	95	103	111	119	127	135	143
7	15	23	31	39	47	55	63	71	79	87	95	103	111	119	127	135	143
8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144
8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144
8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144
8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144

Table 6.1.3.1.5-4. Reverse Traffic Channel Interleaver Memory (Write Operation) for 1200 and 1800 bps

1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69
1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69
1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69
1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69
1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69
1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69
1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69
1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69
2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70
2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70
2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70
2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70
2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70
2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70
2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70
2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72

6.1.3.1.6 Orthogonal Modulation

Modulation for the Reverse CDMA Channel shall be 64-ary orthogonal modulation. One of 64 possible modulation symbols is transmitted for each six repeated code symbols. The modulation symbol shall be one of 64 mutually orthogonal waveforms generated using Walsh functions. These modulation symbols are given in Table 6.1.3.1.6-1 and are numbered 0 through 63. The modulation symbols shall be selected according to the following formula:

$$\text{Modulation symbol index} = c_0 + 2c_1 + 4c_2 + 8c_3 + 16c_4 + 32c_5,$$

where c_5 shall represent the last (or most recent) and c_0 the first (or oldest) binary valued ('0' and '1') repeated code symbol of each group of six repeated code symbols that form a modulation symbol index.

The 64 by 64 matrix shown in Table 6.1.3.1.6-1 can be generated by means of the following recursive procedure:

$$\mathbf{H}_1 = 0, \qquad \mathbf{H}_2 = \begin{matrix} 0 & 0 \\ 0 & 1 \end{matrix} \cdot$$

$$\mathbf{H}_4 = \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{matrix}, \qquad \mathbf{H}_{2N} = \begin{matrix} \mathbf{H}_N & \mathbf{H}_N \\ \mathbf{H}_N & \overline{\mathbf{H}}_N \end{matrix} \cdot$$

where N is a power of 2 and $\overline{\mathbf{H}}_N$ denotes the binary complement of $\mathbf{H}_N$.

The period of time required to transmit a single modulation symbol shall be equal to 1/4800 second (208.333... μs). The period of time associated with one-sixty-fourth of the modulation symbol is referred to as a Walsh chip and shall be equal to 1/307200 second (3.255... μs).

Within a modulation symbol, Walsh chips shall be transmitted in the order of 0, 1, 2, ..., 63.

Table 6.1.3.1.6-1. 64-ary Orthogonal Symbol Set

Walsh Chip within Symbol

MODULATION SYMBOL INDEX	0 1 2 3	4 5 6 7	8 9 10 11	12 13 14 15	16 17 18 19	20 21 22 23	24 25 26 27	28 29 30 31	32 33 34 35	36 37 38 39	40 41 42 43	44 45 46 47	48 49 50 51	52 53 54 55	56 57 58 59	60 61 62 63
0	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
1	0101	0101	0101	0101	0101	0101	0101	0101	0101	0101	0101	0101	0101	0101	0101	0101
2	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011
3	0110	0110	0110	0110	0110	0110	0110	0110	0110	0110	0110	0110	0110	0110	0110	0110
4	0000	1111	0000	1111	0000	1111	0000	1111	0000	1111	0000	1111	0000	1111	0000	1111
5	0101	1010	0101	1010	0101	1010	0101	1010	0101	1010	0101	1010	0101	1010	0101	1010
6	0011	1100	0011	1100	0011	1100	0011	1100	0011	1100	0011	1100	0011	1100	0011	1100
7	0110	1001	0110	1001	0110	1001	0110	1001	0110	1001	0110	1001	0110	1001	0110	1001
8	0000	0000	1111	1111	0000	0000	1111	1111	0000	0000	1111	1111	0000	0000	1111	1111
9	0101	0101	1010	1010	0101	0101	1010	1010	0101	0101	1010	1010	0101	0101	1010	1010
10	0011	0011	1100	1100	0011	0011	1100	1100	0011	0011	1100	1100	0011	0011	1100	1100
11	0110	0110	1001	1001	0110	0110	1001	1001	0110	0110	1001	1001	0110	0110	1001	1001
12	0000	1111	1111	0000	0000	1111	1111	0000	0000	1111	1111	0000	0000	1111	1111	0000
13	0101	1010	1010	0101	0101	1010	1010	0101	0101	1010	1010	0101	0101	1010	1010	0101
14	0011	1100	1100	0011	0011	1100	1100	0011	0011	1100	1100	0011	0011	1100	1100	0011
15	0110	1001	1001	0110	0110	1001	1001	0110	0110	1001	1001	0110	0110	1001	1001	0110
16	0000	0000	0000	0000	1111	1111	1111	1111	0000	0000	0000	0000	1111	1111	1111	1111
17	0101	0101	0101	0101	1010	1010	1010	1010	0101	0101	0101	0101	1010	1010	1010	1010
18	0011	0011	0011	0011	1100	1100	1100	1100	0011	0011	0011	0011	1100	1100	1100	1100
19	0110	0110	0110	0110	1001	1001	1001	1001	0110	0110	0110	0110	1001	1001	1001	1001
20	0000	1111	0000	1111	1111	0000	1111	0000	0000	1111	0000	1111	1111	0000	1111	0000
21	0101	1010	0101	1010	1010	0101	1010	0101	0101	1010	0101	1010	1010	0101	1010	0101
22	0011	1100	0011	1100	1100	0011	1100	0011	0011	1100	0011	1100	1100	0011	1100	0011
23	0110	1001	0110	1001	1001	0110	1001	0110	0110	1001	0110	1001	1001	0110	1001	0110
24	0000	0000	1111	1111	1111	1111	0000	0000	0000	0000	1111	1111	1111	1111	0000	0000
25	0101	0101	1010	1010	1010	1010	0101	0101	0101	0101	1010	1010	1010	1010	0101	0101
26	0011	0011	1100	1100	1100	1100	0011	0011	0011	0011	1100	1100	1100	1100	0011	0011
27	0110	0110	1001	1001	1001	1001	0110	0110	0110	0110	1001	1001	1001	1001	0110	0110
28	0000	1111	1111	0000	1111	0000	0000	1111	0000	1111	1111	0000	1111	0000	0000	1111
29	0101	1010	1010	0101	1010	0101	0101	1010	0101	1010	1010	0101	1010	0101	0101	1010
30	0011	1100	1100	0011	1100	0011	0011	1100	0011	1100	1100	0011	1100	0011	0011	1100
31	0110	1001	1001	0110	1001	0110	0110	1001	0110	1001	1001	0110	1001	0110	0110	1001
32	0000	0000	0000	0000	0000	0000	0000	0000	1111	1111	1111	1111	1111	1111	1111	1111
33	0101	0101	0101	0101	0101	0101	0101	0101	1010	1010	1010	1010	1010	1010	1010	1010
34	0011	0011	0011	0011	0011	0011	0011	0011	1100	1100	1100	1100	1100	1100	1100	1100
35	0110	0110	0110	0110	0110	0110	0110	0110	1001	1001	1001	1001	1001	1001	1001	1001
36	0000	1111	0000	1111	0000	1111	0000	1111	1111	0000	1111	0000	1111	0000	1111	0000
37	0101	1010	0101	1010	0101	1010	0101	1010	1010	0101	1010	0101	1010	0101	1010	0101
38	0011	1100	0011	1100	0011	1100	0011	1100	1100	0011	1100	0011	1100	0011	1100	0011
39	0110	1001	0110	1001	0110	1001	0110	1001	1001	0110	1001	0110	1001	0110	1001	0110
40	0000	0000	1111	1111	0000	0000	1111	1111	1111	1111	0000	0000	1111	1111	0000	0000
41	0101	0101	1010	1010	0101	0101	1010	1010	1010	1010	0101	0101	1010	1010	0101	0101
42	0011	0011	1100	1100	0011	0011	1100	1100	1100	1100	0011	0011	1100	1100	0011	0011
43	0110	0110	1001	1001	0110	0110	1001	1001	1001	1001	0110	0110	1001	1001	0110	0110
44	0000	1111	1111	0000	0000	1111	1111	0000	1111	0000	0000	1111	1111	0000	0000	1111
45	0101	1010	1010	0101	0101	1010	1010	0101	1010	0101	0101	1010	1010	0101	0101	1010
46	0011	1100	1100	0011	0011	1100	1100	0011	1100	0011	0011	1100	1100	0011	0011	1100
47	0110	1001	1001	0110	0110	1001	1001	0110	1001	0110	0110	1001	1001	0110	0110	1001
48	0000	0000	0000	0000	1111	1111	1111	1111	1111	1111	1111	1111	0000	0000	0000	0000
49	0101	0101	0101	0101	1010	1010	1010	1010	1010	1010	1010	1010	0101	0101	0101	0101
50	0011	0011	0011	0011	1100	1100	1100	1100	1100	1100	1100	1100	0011	0011	0011	0011
51	0110	0110	0110	0110	1001	1001	1001	1001	1001	1001	1001	1001	0110	0110	0110	0110
52	0000	1111	0000	1111	1111	0000	1111	0000	1111	0000	1111	0000	0000	1111	0000	1111
53	0101	1010	0101	1010	1010	0101	1010	0101	1010	0101	1010	0101	0101	1010	0101	1010
54	0011	1100	0011	1100	1100	0011	1100	0011	1100	0011	1100	0011	0011	1100	0011	1100
55	0110	1001	0110	1001	1001	0110	1001	0110	1001	0110	1001	0110	0110	1001	0110	1001
56	0000	0000	1111	1111	1111	1111	0000	0000	1111	1111	0000	0000	0000	0000	1111	1111
57	0101	0101	1010	1010	1010	1010	0101	0101	1010	1010	0101	0101	0101	0101	1010	1010
58	0011	0011	1100	1100	1100	1100	0011	0011	1100	1100	0011	0011	0011	0011	1100	1100
59	0110	0110	1001	1001	1001	1001	0110	0110	1001	1001	0110	0110	0110	0110	1001	1001
60	0000	1111	1111	0000	1111	0000	0000	1111	1111	0000	0000	1111	0000	1111	1111	0000
61	0101	1010	1010	0101	1010	0101	0101	1010	1010	0101	0101	1010	0101	1010	1010	0101
62	0011	1100	1100	0011	1100	0011	0011	1100	1100	0011	0011	1100	0011	1100	1100	0011
63	0110	1001	1001	0110	1001	0110	0110	1001	1001	0110	0110	1001	0110	1001	1001	0110

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6.7 Signaling Formats

This section describes the messages sent by the mobile station.

Some bits in the following message formats are marked as RESERVED. These bits allow for extensions to the basic message for future features and capabilities. The mobile station sets all reserved bits to '0'.

All messages have a set of acknowledgment fields. These fields are ACK_SEQ, MSG_SEQ, ACK_REQ, and VALID_ACK for Access Channel messages and ACK_SEQ, MSG_SEQ, and ACK_REQ for Reverse Traffic Channel messages.

In any multi-bit field of a signaling message, the most significant bit shall be transmitted first.

6.7.1 Access Channel

This section describes the messages sent by the mobile station on the Access Channel (see 6.1.3.2).

6.7.1.1 Access Channel Structure

An Access Channel slot is (3 + MAX_CAP_SZ) + (1 + PAM_SZ) Access Channel frames in length. An Access Channel slot begins and ends on an Access Channel frame boundary. Access Channel slots begin at Access Channel frames, in which

$$t \bmod (4 + \mathrm{MAX\_CAP\_SZ} + \mathrm{PAM\_SZ}) = 0,$$

where t is the System Time in frames. Note that all Access Channels associated with a particular Paging Channel have the same slot size, and that all of the slots begin at the same time. Figure 6.7.1.1-1 shows an example of Access Channel slots. Figure 6.7.1.1-2 shows the Access Channel structure.

The Access Channel slot length may differ from base station to base station. A mobile station shall determine the beginning and length of the Access Channel slot, prior to transmission.

An Access Channel transmission consists of the Access Channel preamble and the *Access Channel Message* capsule. An Access Channel transmission shall be an integer number of Access Channel frames in length, and shall not exceed 4 + MAX_CAP_SZ + PAM_SZ Access Channel frames in length.

On each Access Channel transmission, the mobile station shall transmit a preamble consisting of frames of 96 zeros (see 6.1.3.2.2.1), starting at the beginning of the slot (plus PN randomization, as specified in 6.6.3.1.1.2) and 1 + PAM_SZ Access Channel frames in length. The mobile station shall transmit an *Access Channel Message* capsule, immediately following the preamble.